

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION

(PCT Article 36 and Rule 70)

REC'D 15 SEP 2004

REPORT

PCT

29 DEC 2004

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| Applicant's or agent's file reference P100601WO | FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) | |
| International application No. PCT/GB 03/02873 | International filing date (day/month/year) 03.07.2003 | Priority date (day/month/year) 04.07.2002 |
| International Patent Classification (IPC) or both national classification and IPC F16H59/04 | | |
| Applicant EATON CORPORATION ET AL. | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

- I Basis of the opinion
- II Priority
- III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

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| Date of submission of the demand 02.02.2004 | Date of completion of this report 16.09.2004 |
| Name and mailing address of the International preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016 | Authorized Officer Revilla Soler, X Telephone No. +31 70 340-4092 |



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB 03/02873

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1, 7-13 as originally filed
2-6, 6a received on 03.09.2004 with letter of 01.09.2004

Claims, Numbers

1-8 received on 03.09.2004 with letter of 01.09.2004

Drawings, Sheets

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:
- the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB 03/02873

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|-----|
| Novelty (N) | Yes: Claims | 1-8 |
| | No: Claims | |
| Inventive step (IS) | Yes: Claims | 1-8 |
| | No: Claims | |
| Industrial applicability (IA) | Yes: Claims | 1-8 |
| | No: Claims | |

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Technical Field: Shift lever mechanism.

State of the art: Document US A1 3 064 493 constitutes the closest prior art. This document discloses a shift lever mechanism comprising pivoting means adapted to facilitate pivoting of the lever from a neutral position into a predetermined position, and biasing means disposed coaxially with the lever operable to bias the lever into a predetermined position. Three elements are placed coaxially to the lever, two of these elements, which are semi-spherical, slide one on the other in order to bias the lever into a predetermined position.

Problem: Certainty of having the lever in a neutral position, providing a bad feel to the user.

Solution: By the remaining features of the independent claim 1. The biasing member is placed between three different elements, the third element being fixed to the lever. When the shift lever is into a gear selection position, the second element bears onto the first element to produce a returning biasing force which by way of the third element fixed to the lever and the biasing element biases the lever into the neutral position.

Thus, independent claim 1 and dependent claims 2 to 8 meet the requirements of the PCT in respect to novelty and inventive step (Articles 33(2) and 33(3)).

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Known biasing means generally comprise a pair of diametrically opposing return pins operable to contact opposite side surfaces of the lever. The return pins are disposed along an axis transverse to that of the lever in a biased neutral position and are operable to apply a biasing force on the lower regions of the side surfaces of the lever. A gap, due to manufacturing tolerances, normally exists between each side surface and the associated return pin.

In use, pivotal displacement of the lever, from a neutral position, causes it to abut the relevant return pin and, on further displacement of the lever, displaces the return pin against the biasing force of a spring, thereby applying a returning force on the lever operable to encourage the lever back into the neutral position.

The above mentioned known mechanisms experience undesirable movement of the lever due to biasing means, in the form of return pins, being disposed only in limited directional positions relative to displacement of the lever. In order to have a completely biased lever it would be necessary to have a return pin disposed in each direction in which the lever is displaceable. This would clearly be uneconomic as each return pin requires a hole machined into the housing in which it is disposed.

Further, the gap between each side surface of the lever and the associated return pin translates into undesirable movement of the lever, which is felt by a user.

Furthermore, the disposition of the return pins, transverse to the longitudinal axis of the housing, and the length of travel required in the pins to provide the desired biasing force, dictates the overall minimum width of the mechanism.

US 3064493A discloses a gear shift lever mounted on pivoting means. The pivoting means comprises a ball consisting of two parts, a cam mechanism and a spring operative to maintain the two parts of the ball in contact with a co-operating socket. The cam mechanism acts by way of the ball to maintain the gear shift lever in one position.

However, this shift lever mechanism is disadvantaged in that the lever is only biased in one lateral plane and that the biasing cam mechanism is disposed within the ball.

Therefore, the lateral dimensions of this shift lever mechanism are dictated by the

5 elements thereof extending radially outwards from the longitudinal axis of the mechanism. Furthermore, this shift lever mechanism is relatively complicated to manufacture due to the biasing mechanism being disposed within the pivoting means.

It is desirable for the user to experience a positive feel and positional certainty when the
10 lever is displaced into predetermined positions, including neutral positions.

Further, it is desirable to increase the functional efficiency of shift lever mechanisms and to reduce costs related to manufacturing thereof.

15 Furthermore, a compact mechanism, the size of which is not dictated by elements thereof extending radially outwards from the longitudinal axis of the housing, is desirable.

It is an object of the present invention to provide a shift lever mechanism operable to provide the user with positive feel and positional certainty of the lever.

20 It is also an object of the present invention to provide a shift lever mechanism with increased functional efficiency.

Further, it is an object of the present invention to provide a shift lever mechanism having
25 relatively lower manufacturing costs.

Furthermore, it is an object of the present invention to provide a shift lever mechanism which is compact, the size of which is not dictated by elements thereof extending radially outwards from the longitudinal axis of the housing.

According to the present invention a shift lever mechanism comprises a lever, pivoting means adapted to facilitate pivoting of the lever from a neutral position into a plurality of pivoted gear selection positions, and biasing means, disposed on the lever coaxially therewith and operable to bias the lever into said neutral position,

- 5 characterised in that the biasing means comprises a first element having a bearing face, a second element, disposed co-axially with the lever, having an end face and a biasing face, a third element, disposed on the lever and fixed thereto to extend radially outwards therefrom, and a biasing element, disposed co-axially with the lever, and arranged to extend between the biasing face and the third element, wherein, upon pivoting the lever, from the neutral position in to a gear selection position, the second element end face bears onto the first element bearing face to produce a returning biasing force which, by way of the spring and the third element, is applied to the lever and thereby biases the lever into the neutral position.
- 10

The biasing means may be disposed on the lever such that it is coaxial therewith.

- 15
- The biasing element may be a spring.

- 20
- The shift lever mechanism may comprise a housing, a lever having a longitudinal axis, pivoting means adapted to facilitate pivoting of the lever into a plurality of positions, and biasing means operable to bias the lever into at least one biased position, characterised in that the biasing means is operable to apply a biasing force in a substantially non-transverse direction relative to the longitudinal axis of the lever.

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- The shift lever mechanism may comprise a housing, a lever having a longitudinal axis, pivoting means adapted to facilitate pivoting of the lever into a plurality of positions, and biasing means operable to bias the lever into at least one biased position, characterised in that the biasing means is adapted to apply a biasing force operable to oppose any direction in which the lever is displaceable.
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- The housing may comprise a longitudinal axis and the direction of the applied biasing force may be substantially that of the longitudinal axis of the housing. When in the biased

position, the longitudinal axis may lie substantially in the same direction as the biasing force is applicable.

- 5 The lever preferably extends through the first, second, third and biasing elements to form a substantially coaxial arrangement therewith. The biasing element may comprise a spring.

- 10 The first element is advantageously adapted to engage with stop means, which is preferably disposed on the housing, more preferably on an inner wall of the housing. The stop means may comprise a region of reduced diameter of the inner wall of the housing, which may be in the form of an abutment against which the first element engages.

- 15 The stop means may be operable to prevent pivotable displacement of the first member in at least one direction.

- 20 Alternatively, the stop means may be disposed on the lever, or within a transmission system with which it is operatively associated.

- 25 The shift lever mechanism may also comprise second biasing means which may be the same as the first biasing means.

The pivoting means may be disposed on the lever intermediate the first and second biasing means.

- 30 25 The pivoting means may comprise a spherical element advantageously disposed in a retaining cup and operable to pivotally move therein by sphere-to-sphere engagement therewith.

- 30 The spherical element may be fixed to the lever thereby forming a pivot point on the lever. The spherical element may be fixed to the lever by means of a retaining pin. Alternatively, the spherical element may form an integral part of the lever.

The lever may extend through the spherical element to form an arrangement substantially coaxial therewith.

- 5 The spherical element is preferably disposed on the lever intermediate first and second ends thereof.

The spherical element is preferably formed from a plastics material. Alternatively, the spherical element may be formed from a metallic material.

- 10 The retaining cup may be formed from a plastics material. Alternatively, the retaining cup may be formed from a metallic material.

- 15 The retaining cup may be disposed in the housing and may be formed from more than one part.

The present invention will now be described further, by way of example, with reference to the accompanying drawings, in which:

- 20 Figure 1 is a shift lever mechanism according to the present invention, in section through A-A, showing the lever disposed in a biased neutral position;

Figure 2 is the shift lever mechanism of Figure 1, in section through B-B, showing the lever disposed in a neutral position;

- 25 Figure 3 is the shift lever mechanism of Figures 1 and 2, in section through B-B, showing the lever disposed intermediate the neutral position and a predetermined position, engaging resilient means;

Figure 4 is the shift lever mechanism of the abovementioned figures, in section through B-B, showing the lever disposed in a predetermined position having overcome the resilient means; and,

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Figure 5 is the shift lever mechanism of the abovementioned figures, in section through A-A, showing the lever disposed in a predetermined position.

Referring to the drawings there is shown a shift lever mechanism 10 comprising a
10 housing 12, having a longitudinal axis 14, a lever 16, having a first end 18, a second end 20 and a longitudinal axis 22, pivoting means 24, and biasing means 26

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CLAIMS

- 5 1. A shift lever mechanism (10) comprising, a lever (16), pivoting means (24) adapted to facilitate pivoting of the lever (16) from a neutral position into a plurality of pivoted gear selection positions, and biasing means (26), disposed on the lever (16) coaxially therewith and operable to bias the lever into said neutral position,
10 characterised in that the biasing means (26) comprises a first element (46) having a bearing face (47), a second element (48), disposed co-axially with the lever (16), having an end face (67) and a biasing face (69), a third element (50), disposed on the lever (16) and fixed thereto to extend radially outwards therefrom, and a biasing element (52), disposed co-axially with the lever, and arranged to extend between the biasing face (69) and the third element (50), wherein, upon pivoting the lever(16), from the neutral position in to a gear selection position, the second element end face(69) bears onto the first element bearing face (47) to produce a returning biasing force which, by way of the biasing element (52) and the third element (50), is applied to the lever (16) and thereby biases the lever into the neutral position.
- 15 2. A shift lever mechanism, as claimed in Claim 1, wherein the second element is displaceable along part of the lever in the direction of the longitudinal axis thereof.
- 20 3. A shift lever mechanism, as claimed in Claim 1 or 2, wherein the biasing means is operable to provide omni-directional biasing of the lever.
- 25 4. A shift lever mechanism, as claimed in any of the preceding claims, comprising a housing (12) having an abutment (56) on which the first element is disposed.
- 30 5. A shift lever mechanism, as claimed in any of the preceding claims, wherein the biasing element (52) is a spring.
6. A shift lever mechanism, as claimed in any of the preceding claims, comprising second biasing means (72).

7. A shift lever mechanism as claimed in Claim 6, wherein the pivoting means is disposed intermediate the first and second biasing means.
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8. A shift lever mechanism as claimed in Claim 6 or 7, wherein the second biasing means is substantially the same as the first biasing means and is arranged on the lever to be reciprocally operable with the first biasing means.

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